[illegible]

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[illegible] © 2018 [illegible]

© 2018

[illegible]

- [illegible]
  - [illegible] TCP/IP [illegible]
  - [illegible]
  - [illegible]

[illegible]

1. **TCP/IP [illegible]**
2. [illegible]

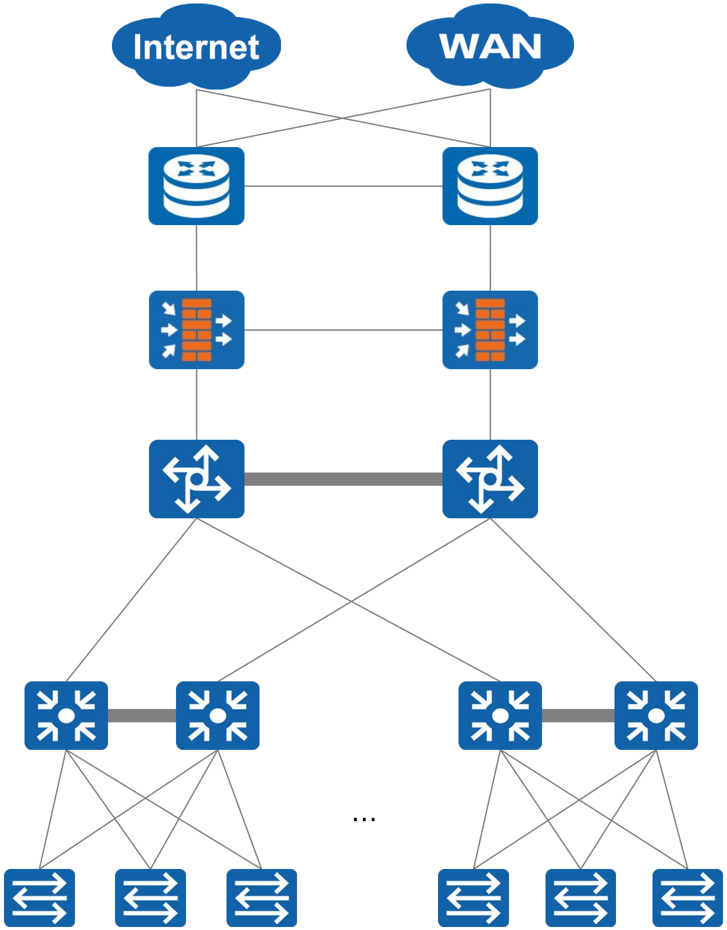
□□□□□□□□

□□□

□□□

□□□

□□□


Internet
WAN
...

OSI [illegible]

- OSI [illegible]
- OSI [illegible]
- OSI [illegible]

OSI [illegible]

	Data unit	Layer	No.	Description
[illegible]	APDU	[illegible]	7	[illegible]
	PPDU	[illegible]	6	[illegible]
	SPDU	[illegible]	5	[illegible]
[illegible]	Segment	[illegible]	4	[illegible]
	Packet	[illegible]	3	[illegible]
	Frame	[illegible]	2	[illegible]
	Bit	[illegible]	1	[illegible]

[illegible] © 2018 [illegible]

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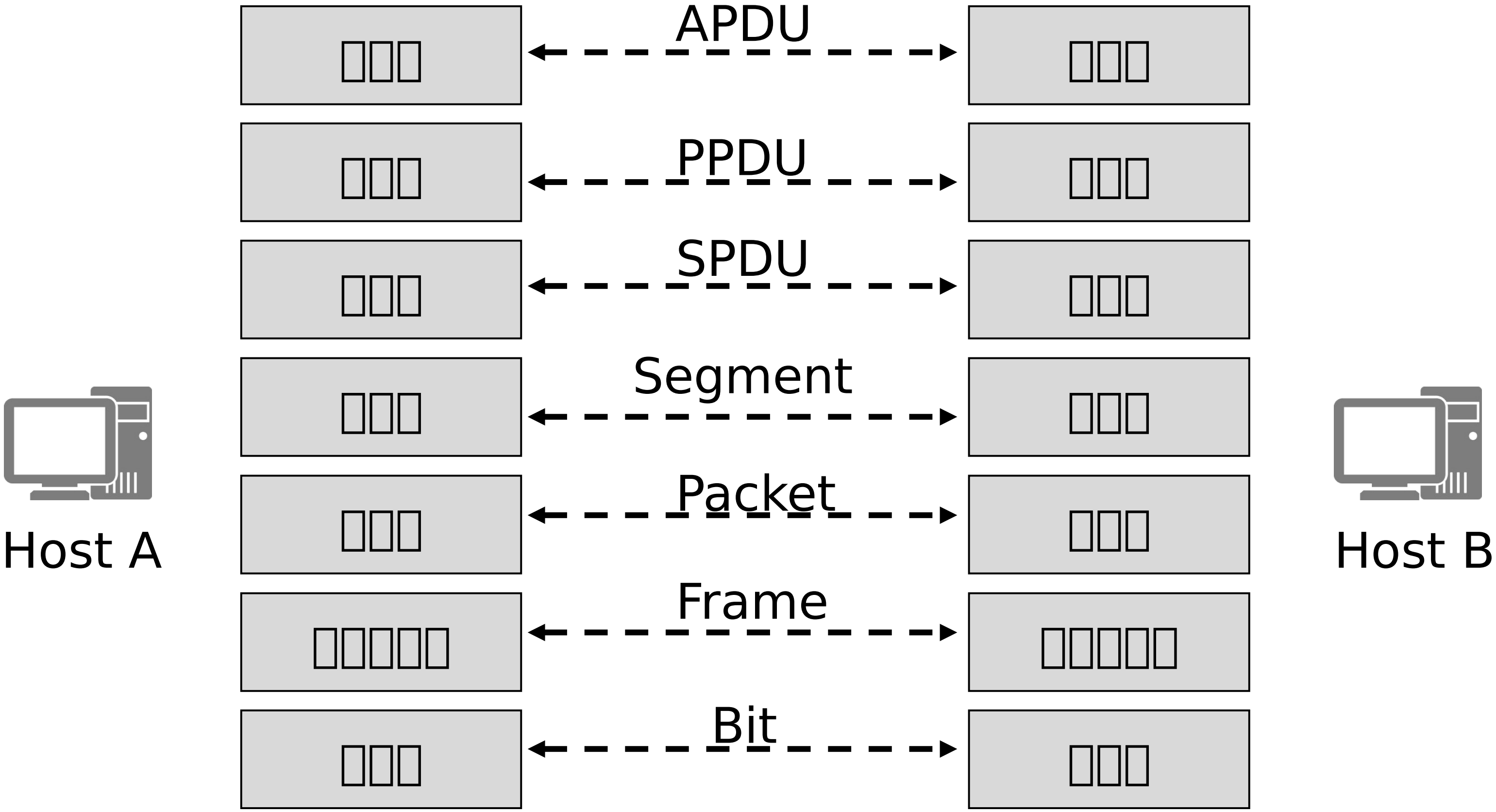
[illegible]

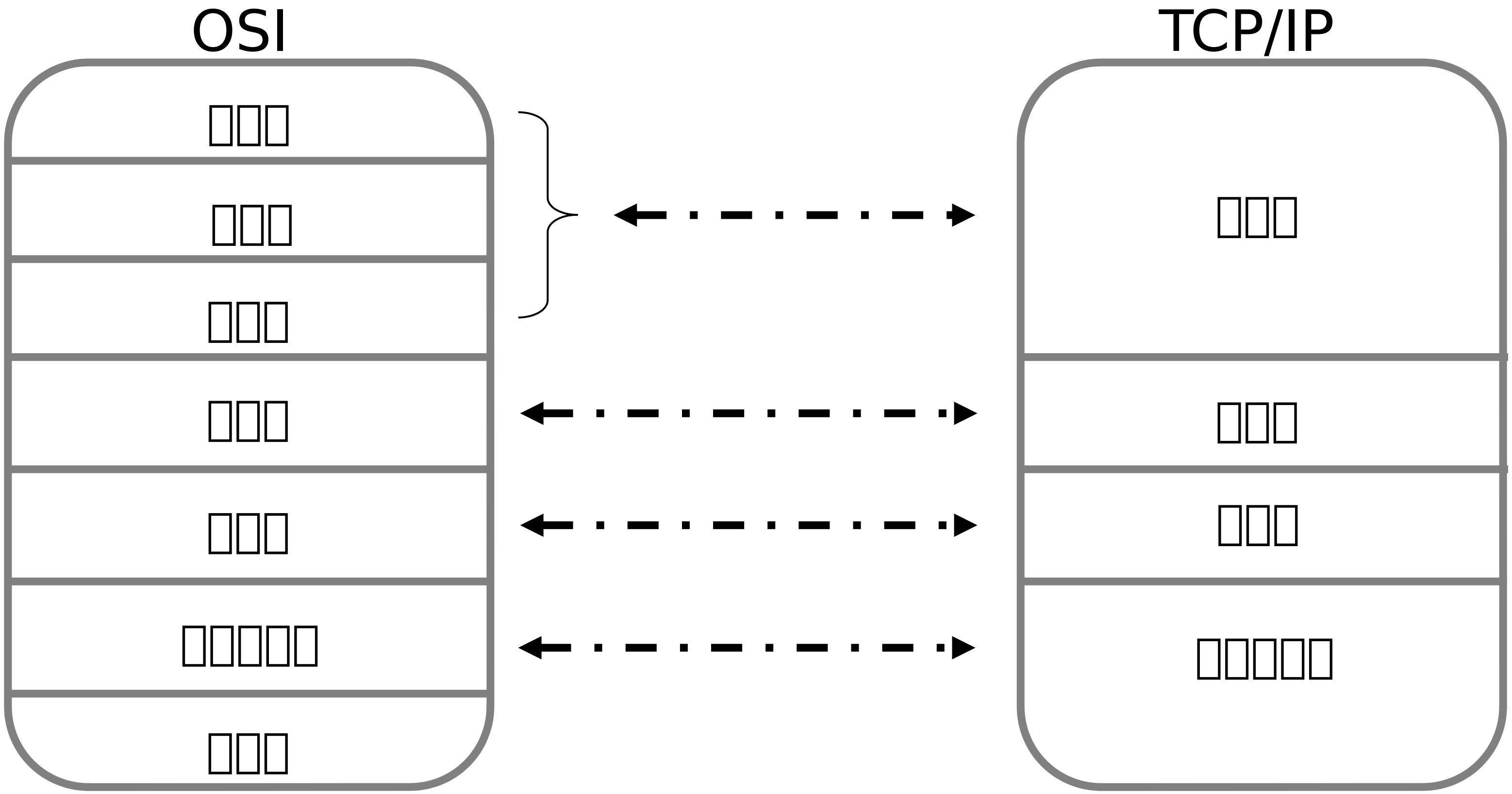
- [illegible]



APDU
PPDU
SPDU
Segment
Packet
Frame
Bit
Host A
Host B

TCP/IP [illegible] OSI [illegible]

- TCP/IP [illegible] OSI [illegible]

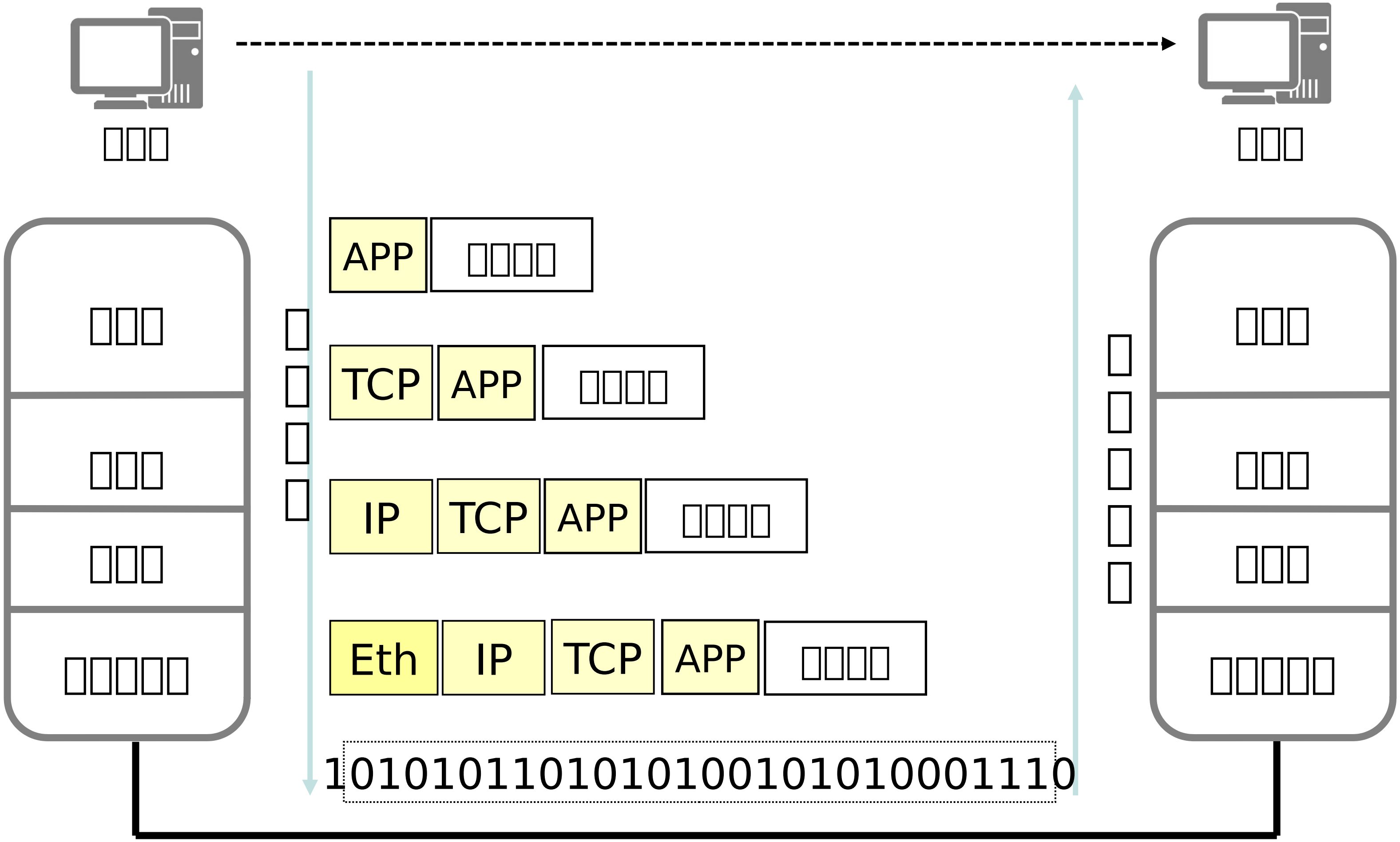


TCP/IP [illegible]

[illegible]	HTTP, Telnet, FTP,TFTP, DNS	[illegible]
[illegible]	TCP/UDP	[illegible]
[illegible]	IP / ICMP, IGMP / ARP, RARP	[illegible]
[illegible]	Ethernet, 802.3, PPP, HDLC, FR	[illegible]

[illegible] © 2018 [illegible]

TCP/IP


APP
TCP
APP
IP
TCP
APP
Eth
IP
TCP
APP
1010101101010100101010001110

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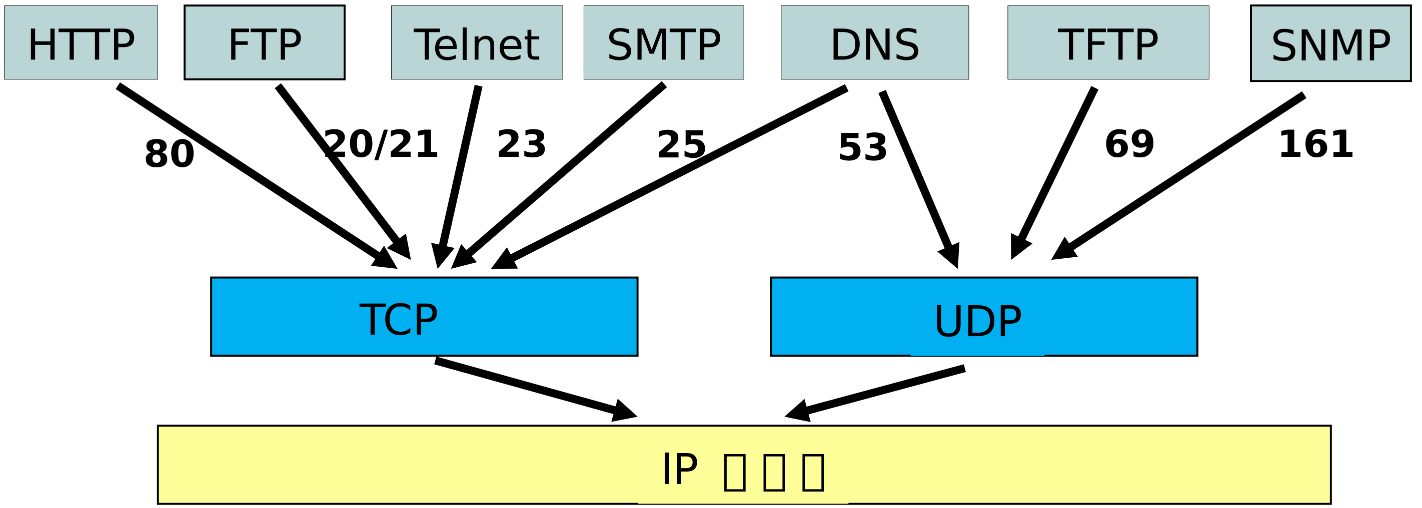
□□□


HTTP
FTP
Telnet
SMTP
DNS
TFTP
SNMP
80
20/21
23
25
53
69
161
TCP
UDP
IP □□□

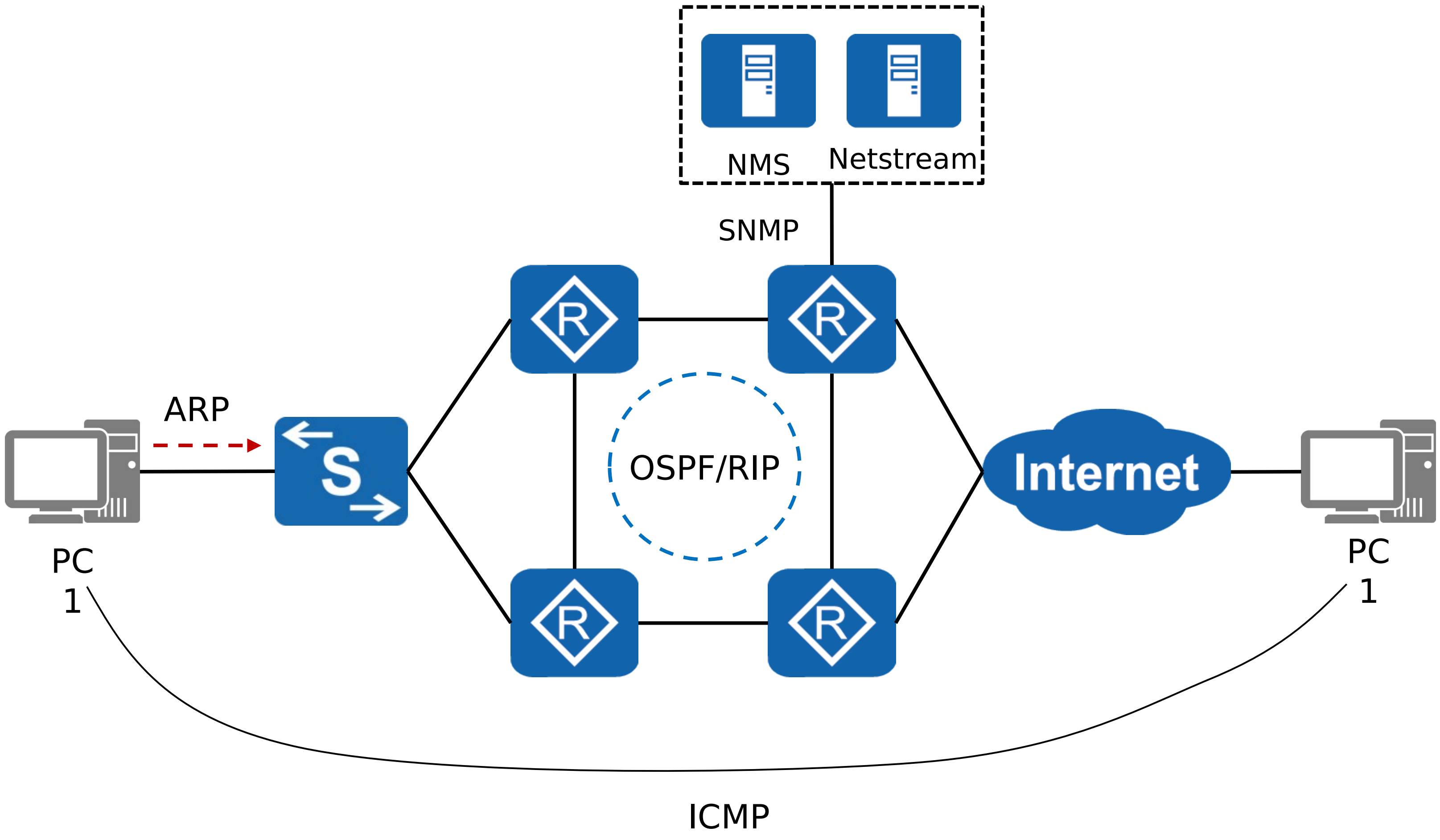
□□□

- □ IP □□□□□ IP □□□□□□□□□ + □□□□

[illegible]

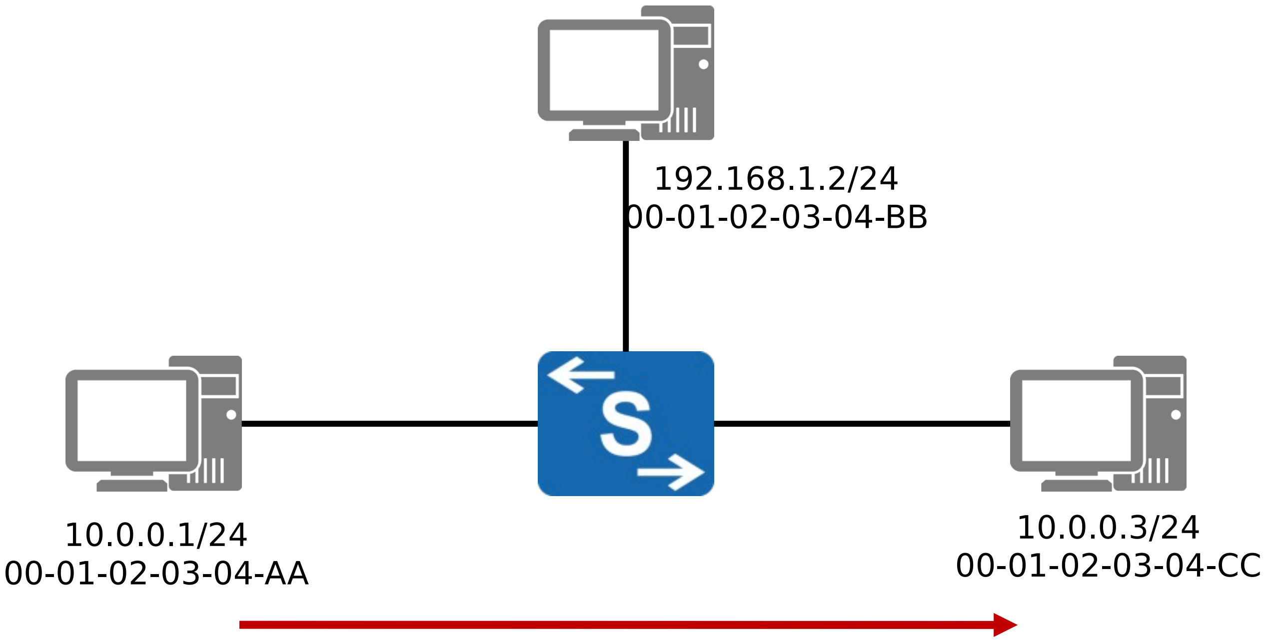
1. TCP/IP [illegible]
2. **[illegible] TCP/IP [illegible]**
   - **[illegible]**
   - [illegible]
   - [illegible]

[illegible]


NMS
Netstream
SNMP
ARP
OSPF/RIP
Internet
PC
1
PC
1
ICMP

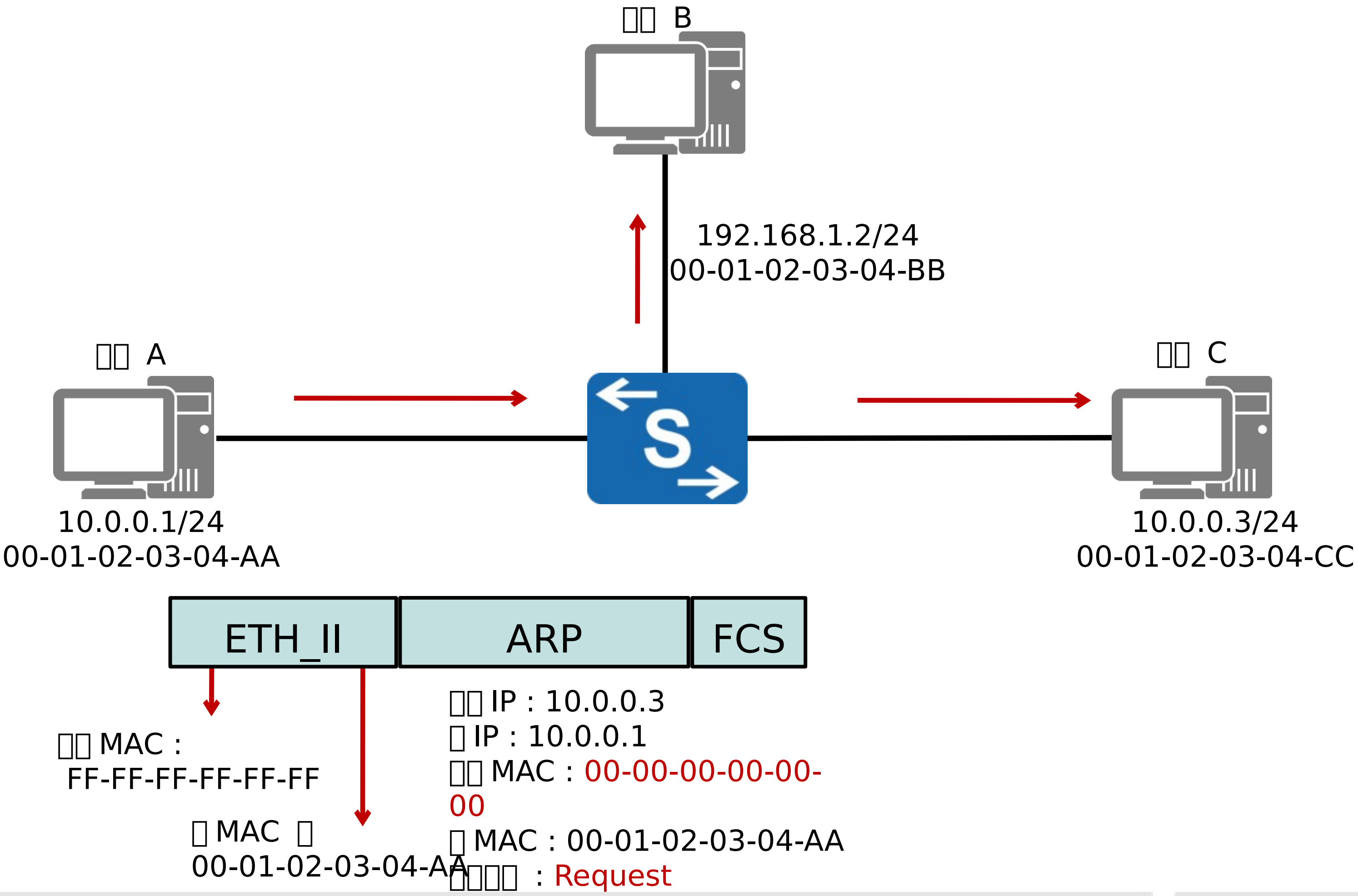
ARP □□

- □□A□□□□□□□□□□C□□□□□□□□□□C□MAC□□□



□□□□ © 2018 □□□□□□□

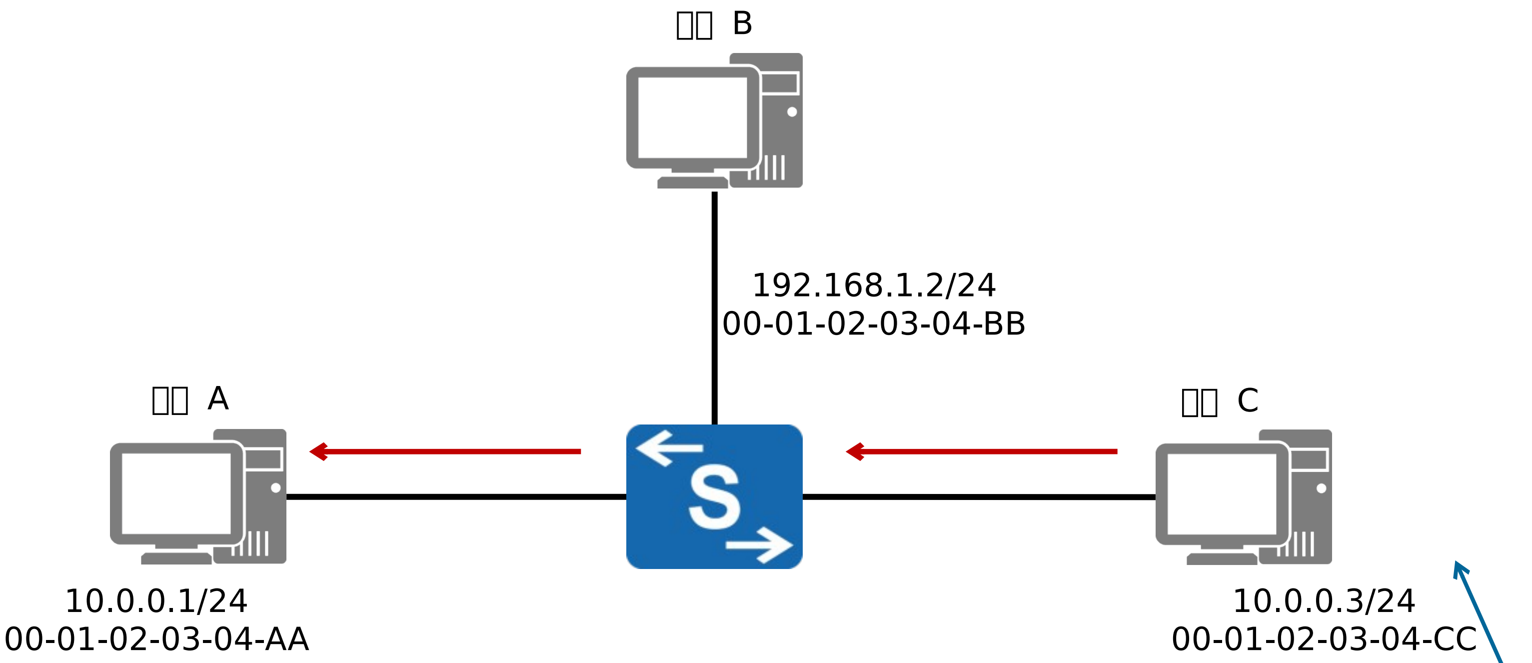
ARP □□



□□ B
192.168.1.2/24
00-01-02-03-04-BB
□□ A
10.0.0.1/24
00-01-02-03-04-AA
□□ C
10.0.0.3/24
00-01-02-03-04-CC
ETH_II
ARP
FCS
□□ MAC :
FF-FF-FF-FF-FF-FF
□ MAC □
00-01-02-03-04-AA
□□ IP : 10.0.0.3
□ IP : 10.0.0.1
□□ MAC : 00-00-00-00-00-00
□ MAC : 00-01-02-03-04-AA
□□□□ : Request

□□□□ © 2018 □□□□□□□□

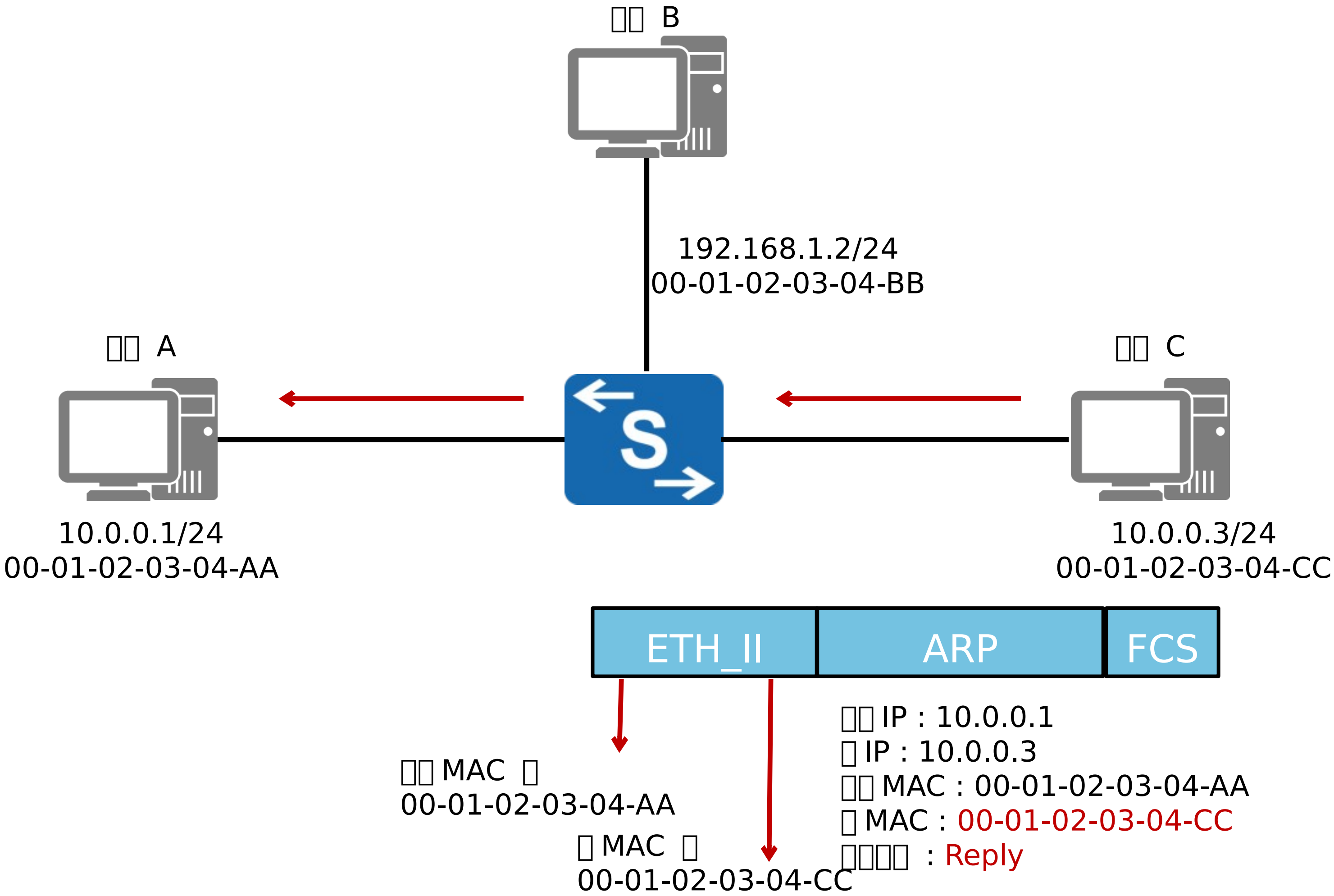
ARP □□（1）




```
Host C>arp -a
Internet address  Physical address      Type
 10.0.0.1         00-01-02-03-04-AA     Dynamic
```

□□□□ © 2018 □□□□□□□□

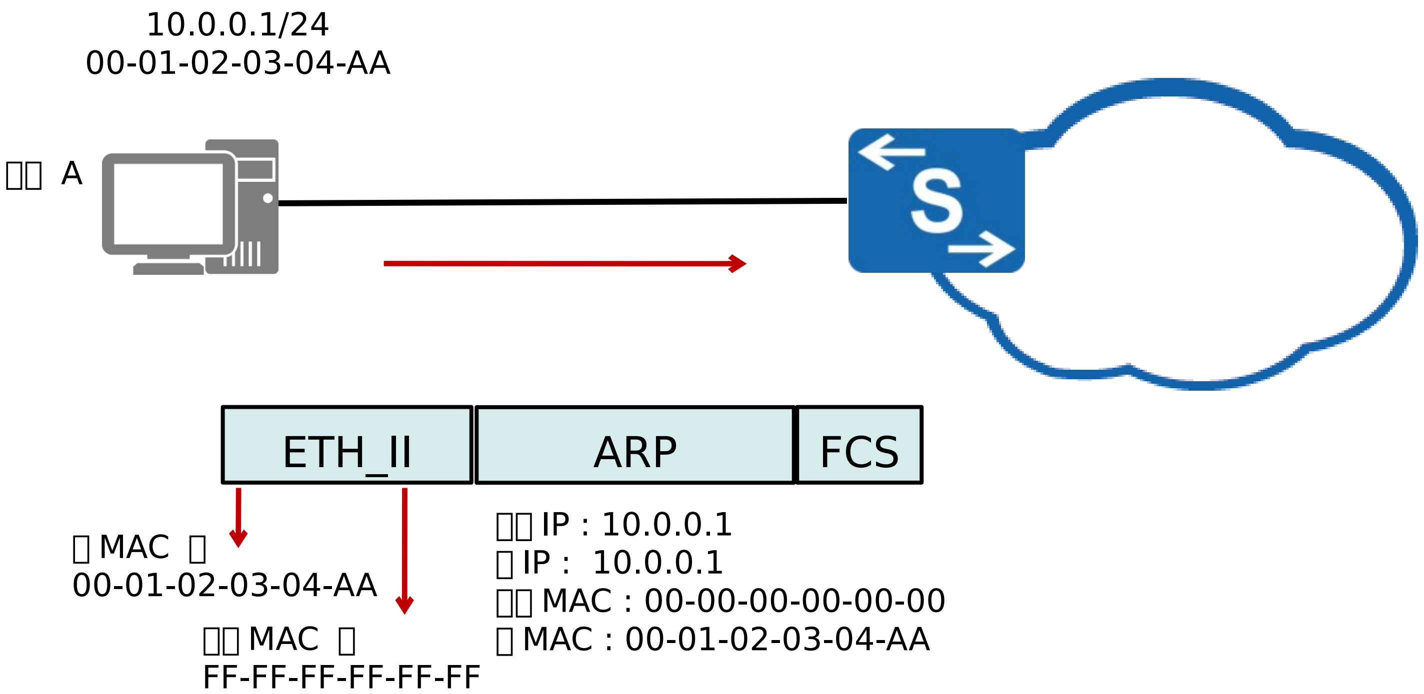
ARP □□ (2)



□□ B
192.168.1.2/24
00-01-02-03-04-BB
□□ A
10.0.0.1/24
00-01-02-03-04-AA
□□ C
10.0.0.3/24
00-01-02-03-04-CC
S
ETH_II
ARP
FCS
□□ MAC □
00-01-02-03-04-AA
□ MAC □
00-01-02-03-04-CC
□□ IP : 10.0.0.1
□ IP : 10.0.0.3
□□ MAC : 00-01-02-03-04-AA
□ MAC : 00-01-02-03-04-CC
□□□□ : Reply

□□ARP

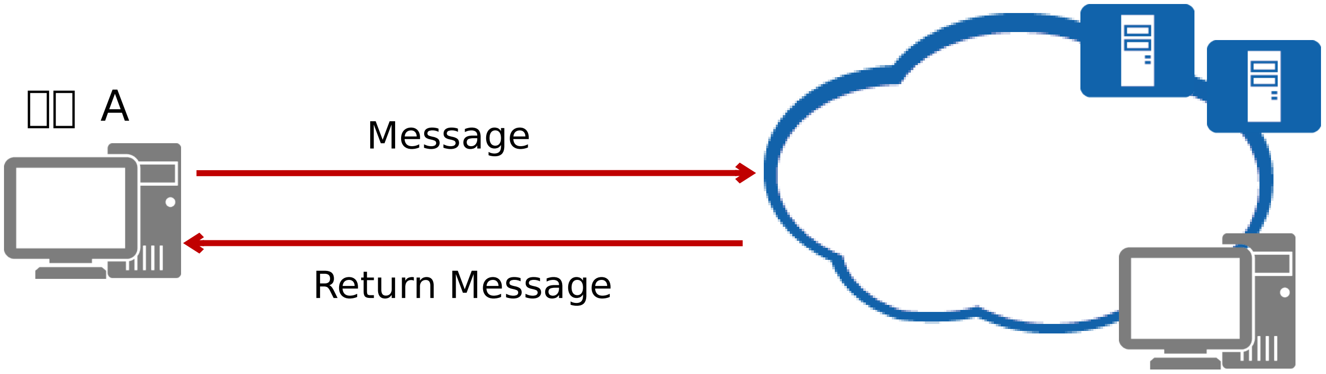
- □□ARP □□□□□□ IP □□□□□□□



10.0.0.1/24
00-01-02-03-04-AA
□□ A
ETH_II
ARP
FCS
□MAC □
00-01-02-03-04-AA
□□MAC □
FF-FF-FF-FF-FF-FF
□□IP : 10.0.0.1
□IP : 10.0.0.1
□□MAC : 00-00-00-00-00-00
□MAC : 00-01-02-03-04-AA

ICMP □□

- ICMP □□□□□□□□□□□□□□□□



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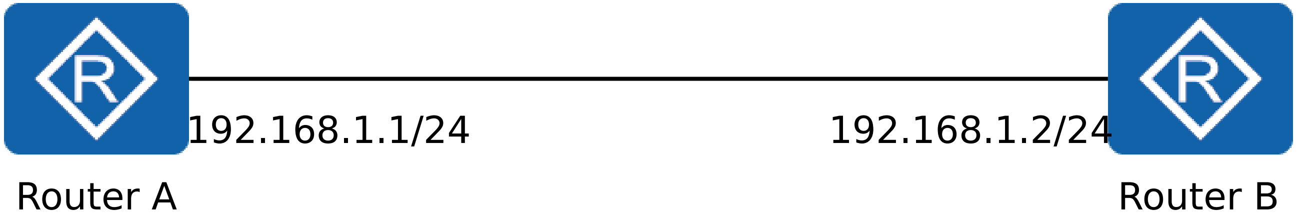
ICMP □□ - Ping (1)




```
<Router A>ping ?
STRING<1-255> IP address or hostname of a remote system
-a            Select source IP address, the default is the IP address of the
              output interface
-c            Specify the number of echo requests to be sent, the default is
              5
-d            Specify the SO_DEBUG option on the socket being used
-f            Set Don't Fragment flag in packet (IPv4-only)
-h            Specify TTL value for echo requests to be sent, the default is
              255
-i            Select the interface sending packets
……
```

□□□□ © 2018 □□□□□□□□

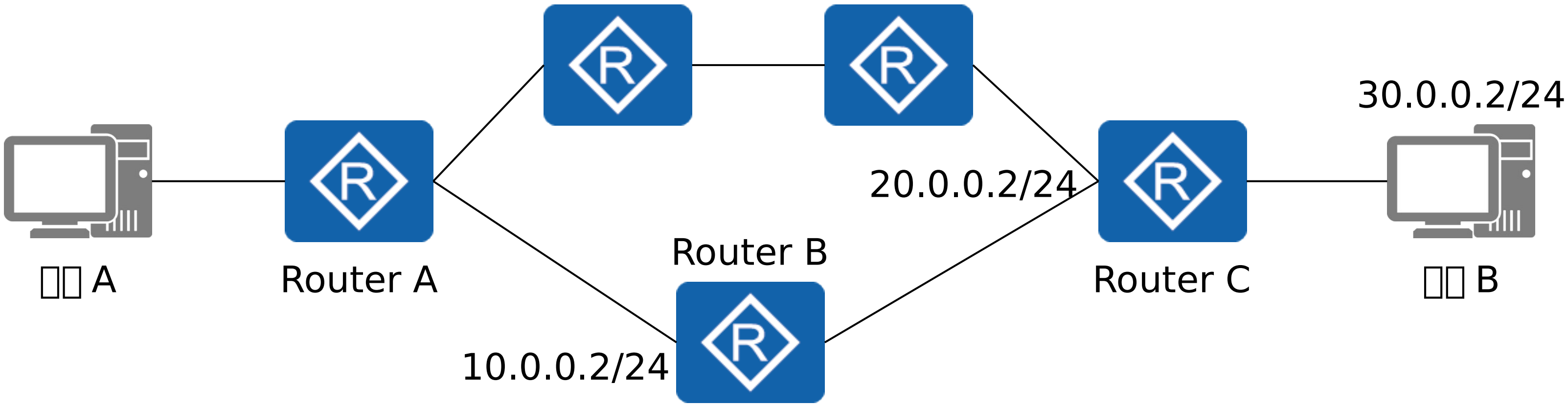
ICMP □□ - Ping (2)

```
[Router A]ping 192.168.1.2
  PING 192.168.1.2 : 56  data bytes, press CTRL_C to break
    Reply from 192.168.1.2 : bytes=56 Sequence=1 ttl=255 time=340 ms
    Reply from 192.168.1.2 : bytes=56 Sequence=2 ttl=255 time=10 ms
    Reply from 192.168.1.2 : bytes=56 Sequence=3 ttl=255 time=30 ms
    Reply from 192.168.1.2 : bytes=56 Sequence=4 ttl=255 time=30 ms
    Reply from 192.168.1.2 : bytes=56 Sequence=5 ttl=255 time=30 ms

  --- 192.168.1.2 ping statistics ---
    5 packet(s) transmitted
    5 packet(s) received
    0.00% packet loss
    round-trip min/avg/max = 10/88/340 ms
```

□□□□ © 2018 □□□□□□□□

ICMP □□ - Tracert (1)




```
<Router A>tracert ?
STRING<1-255>  IP address or hostname of a remote system
-a             Set source IP address, the default is the IP address of the
               output interface
-f             First time to live, the default is 1
-m             Max time to live, the default is 30
-name          Display the host name of the router on each hop
-p             Destination UDP port number, the default is 33434
-q             Number of probe packet, the default is 3
-s             Specify the length of the packets to be sent. The default
               length is 12 bytes
……
```

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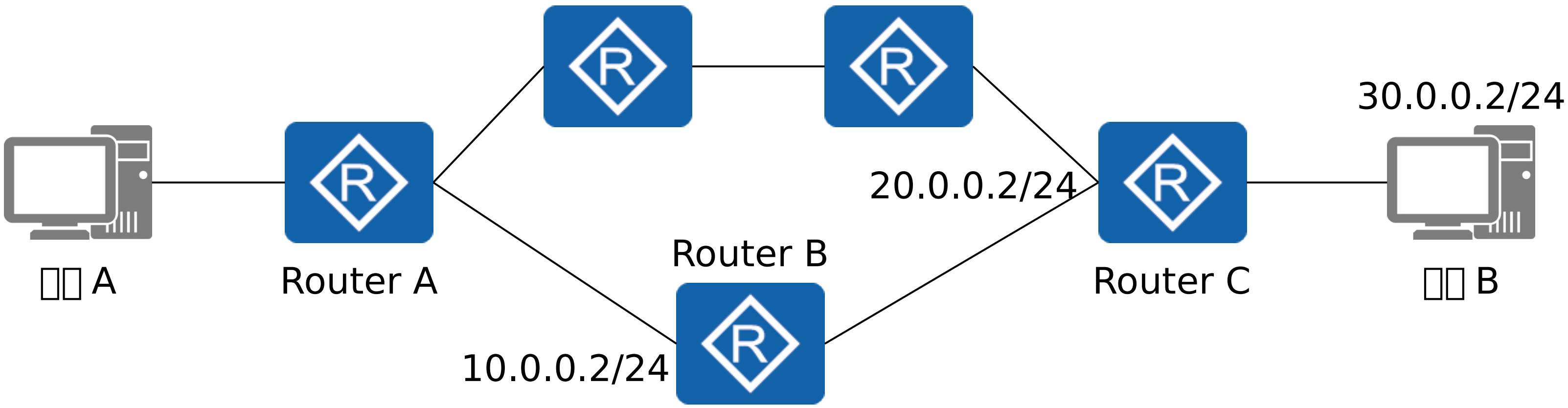
ICMP [illegible] - Tracert (2)

- Tracert [illegible]

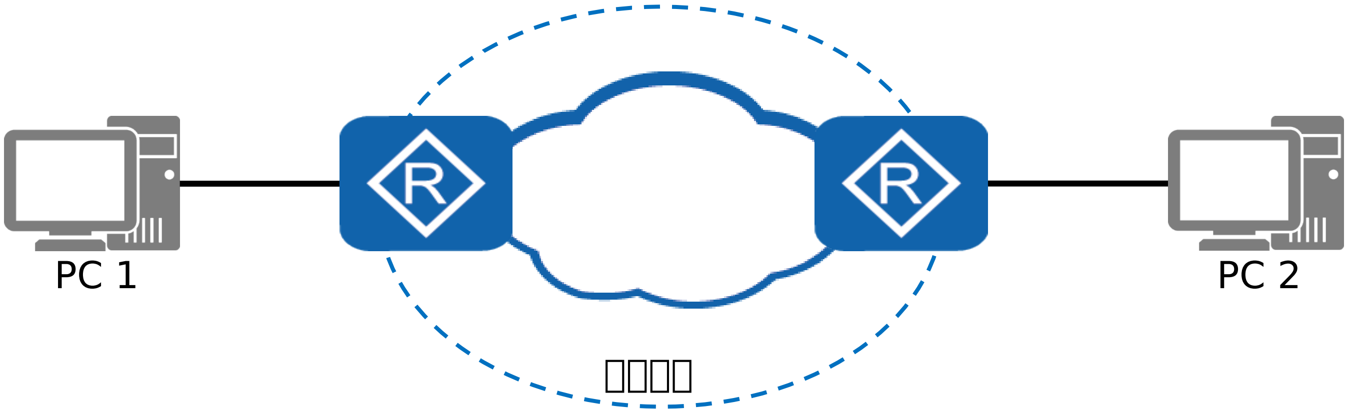



```
<Router A>tracert 30.0.0.2
Tracert to 30.0.0.2(30.0.0.2), max hops:30, packet length:40, press
CTRL_C to break
 1 10.0.0.2 130 ms  50 ms  40 ms
 2 20.0.0.2 80 ms  60 ms  80 ms
 3 30.0.0.2 80 ms  60 ms  70 ms
```

[illegible] © 2018 [illegible]

[illegible]

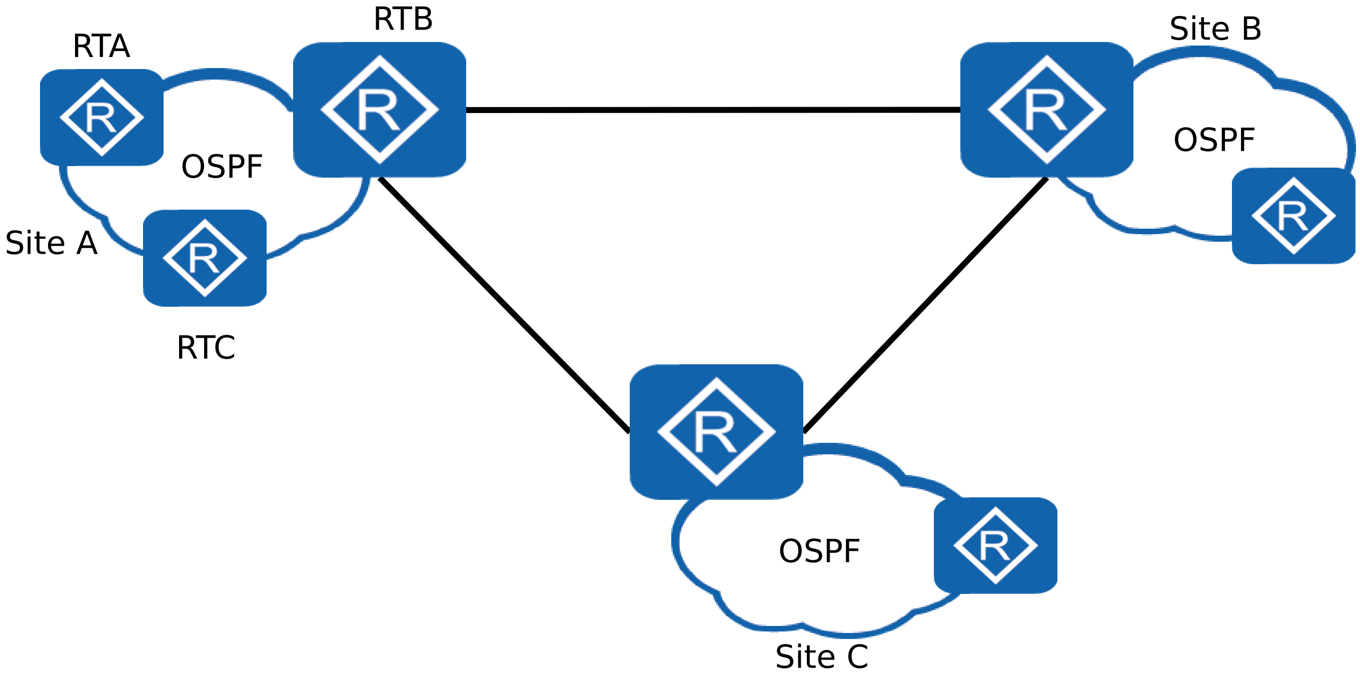
- [illegible]



PC 1
PC 2

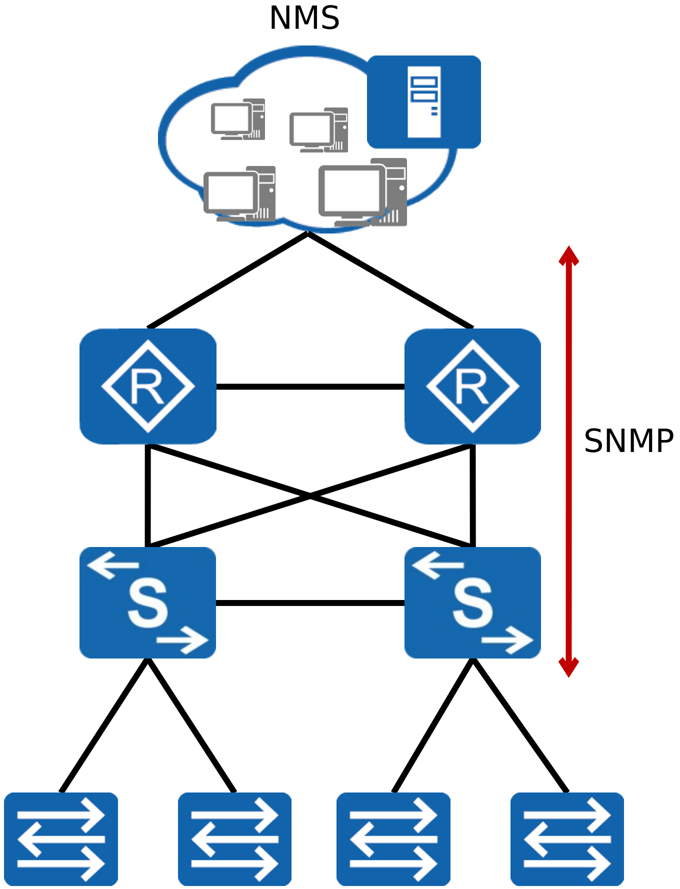
OSPF □□

- □□□
- □□□
- □□□□
- □□□□



SNMP □□

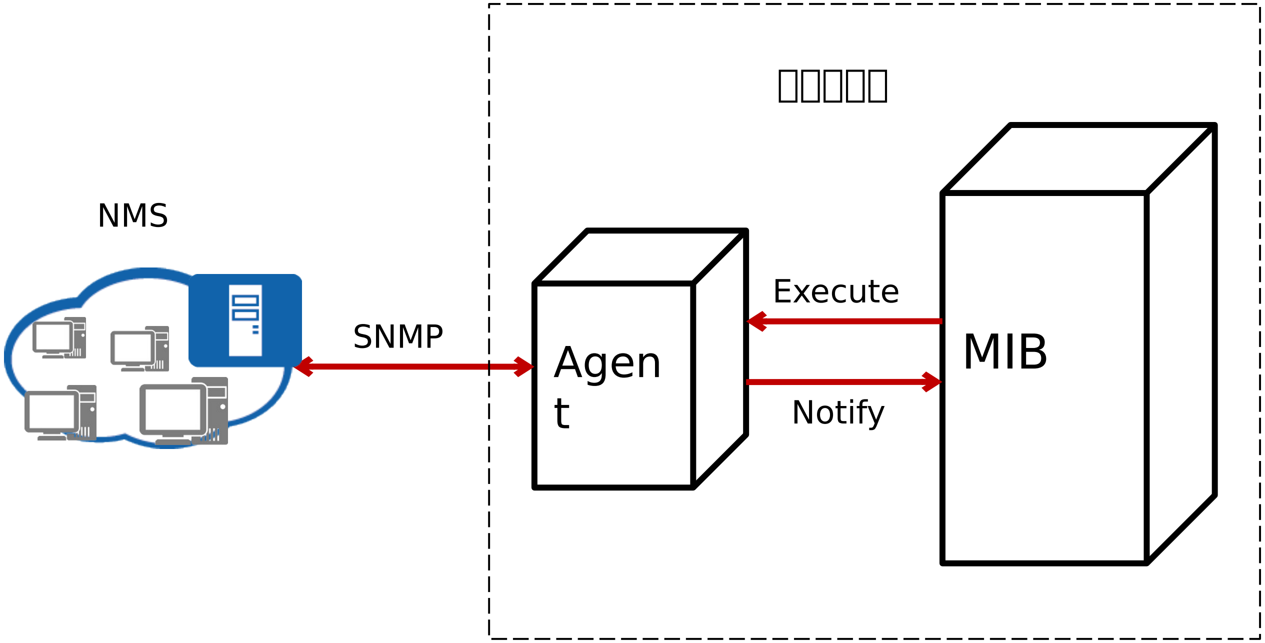
- SNMP □□□□□□□□□□□ NMS □□□□□□□□□□□□□□□□□□□



□□□□ © 2018 □□□□□□□□

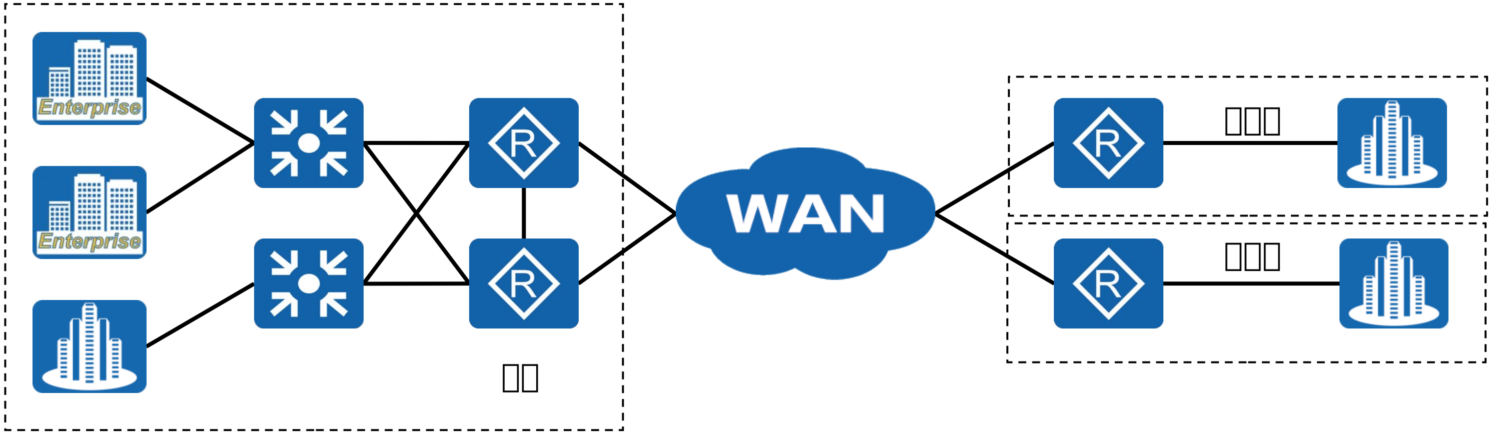
SNMP □□

- SNMP □□ NMS □ Agent □ MIB □□
- Agent □□□□□□□□□□□□
- MIB □□□□□□□□□□□□□□□□□□□



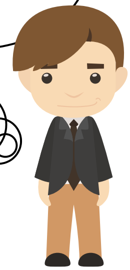
□□□□ © 2018 □□□□□□□□

[illegible]



- [illegible]
- [illegible]
- [illegible]

IT [illegible] ** [illegible]
[illegible]
[illegible]
[illegible]
IT [illegible]
[illegible]… .



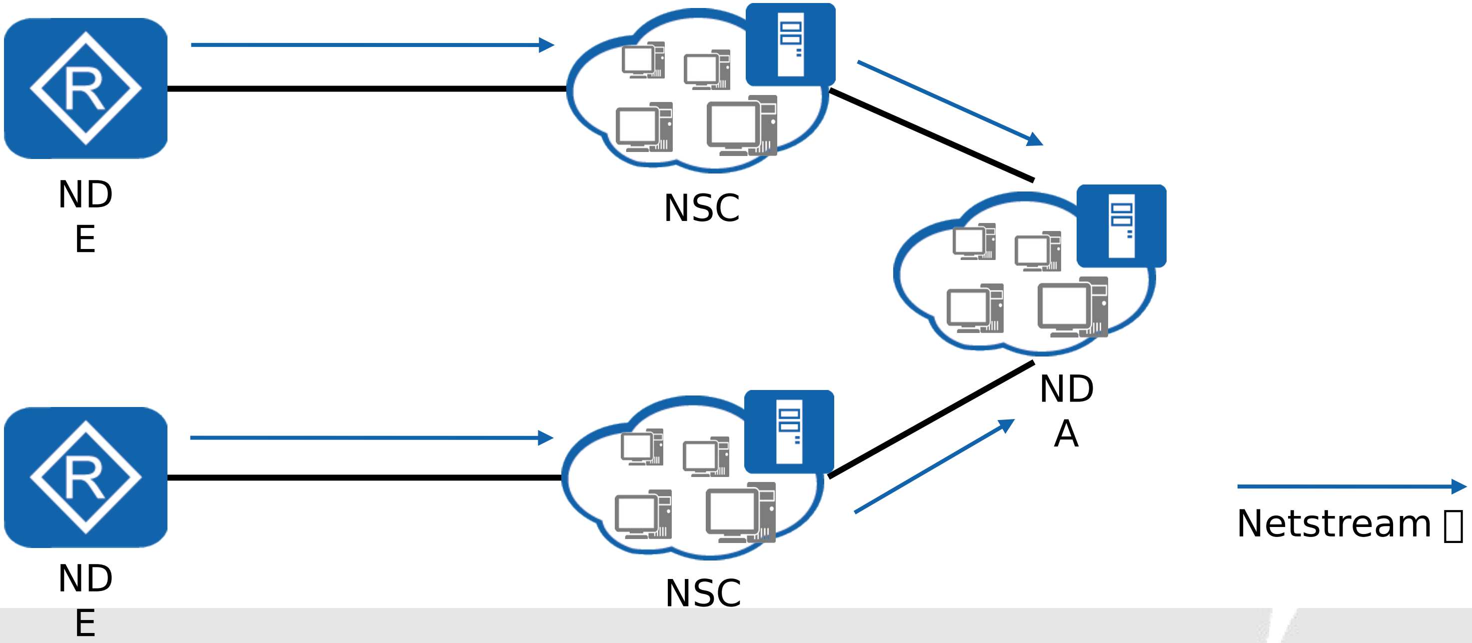
NTA [illegible]

- [illegible]
  - eSight NTA [illegible] Network Traffic Analyzer [illegible] NetFlow [illegible] NetStream [illegible] sFlow [illegible] IP [illegible]
- [illegible]
  - eSight NTA [illegible] NetFlow/NetStream/sFlow [illegible] IP [illegible]

[illegible] © 2018 [illegible]

NetStream [illegible]

- NetStream [illegible]
  [illegible] NDE [illegible] NSC [illegible] NSC [illegible]
  [illegible] NDA [illegible]



[illegible]

1. TCP/IP [illegible]
2. **[illegible]**
   - [illegible]
   - **[illegible]**
   - [illegible]
3. [illegible]

[illegible] © 2018 [illegible]

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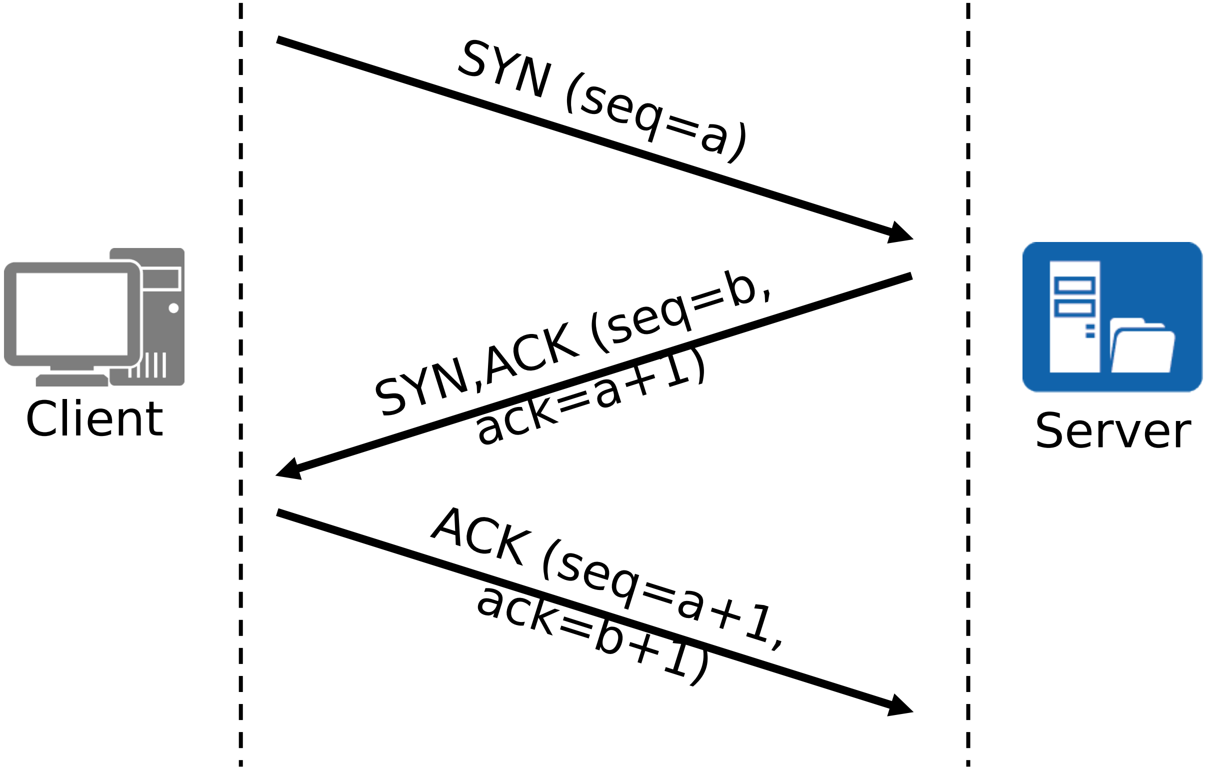
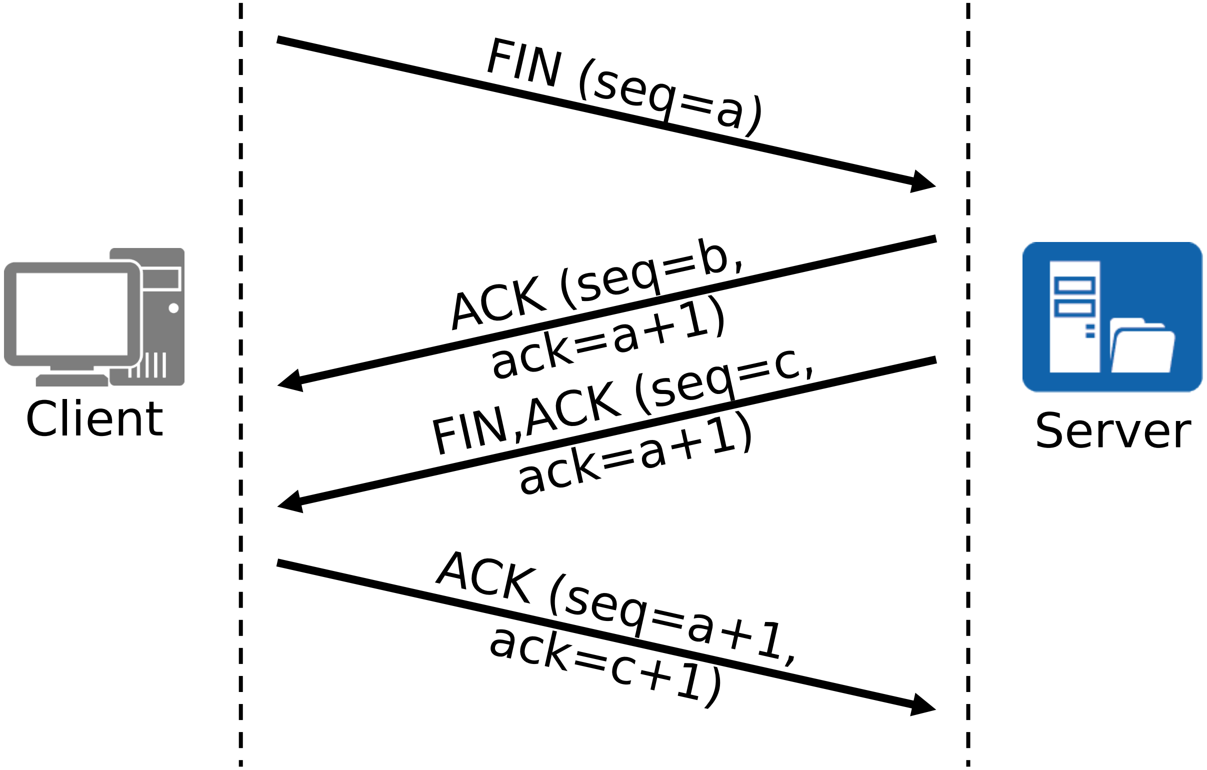
[illegible] TCP [illegible]

- [illegible]



□□ TCP □□

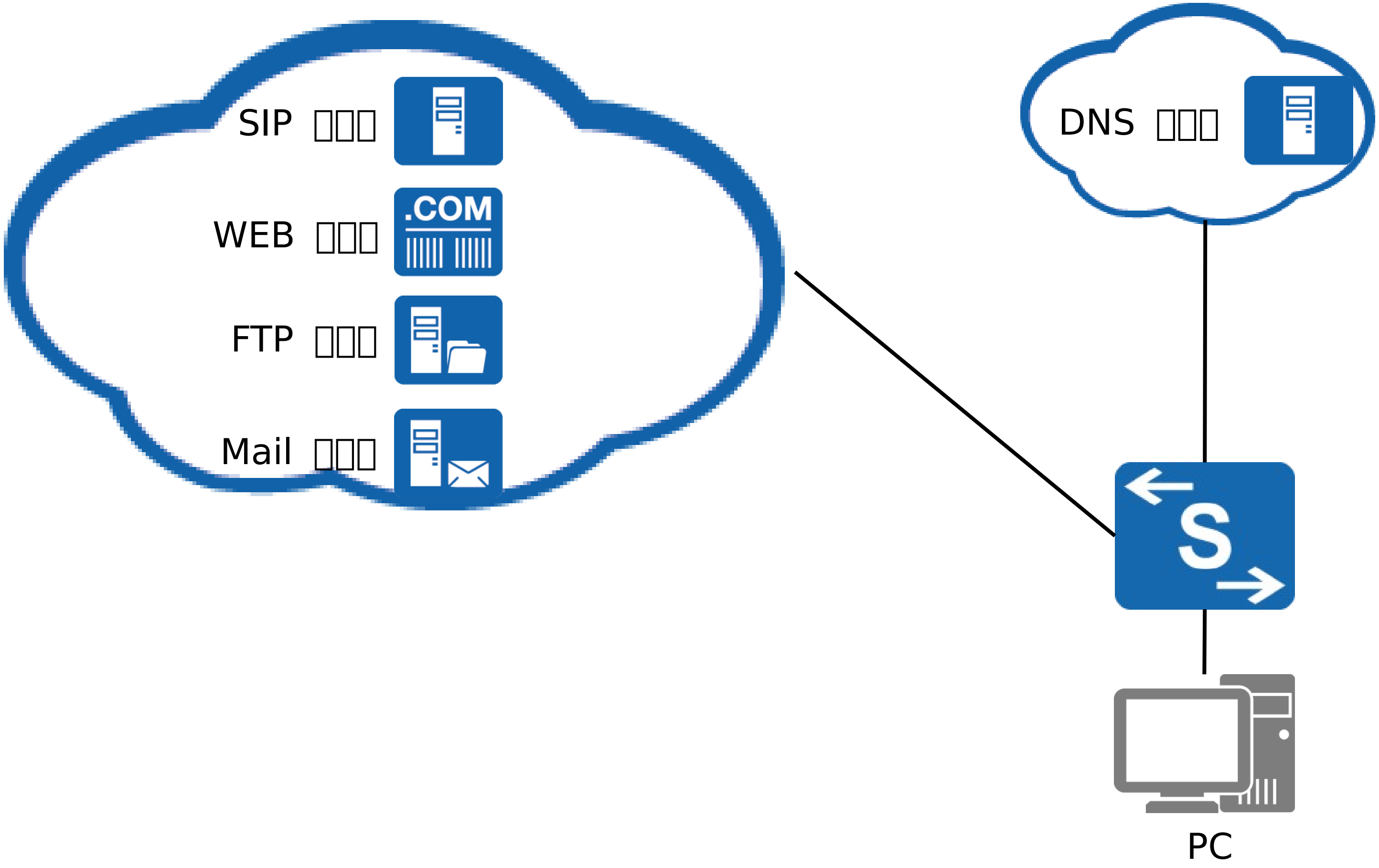
- □□□□



FIN (seq=a)
ACK (seq=b,
ack=a+1)
FIN,ACK (seq=c,
ack=a+1)
ACK (seq=a+1,
ack=c+1)
Client
Server

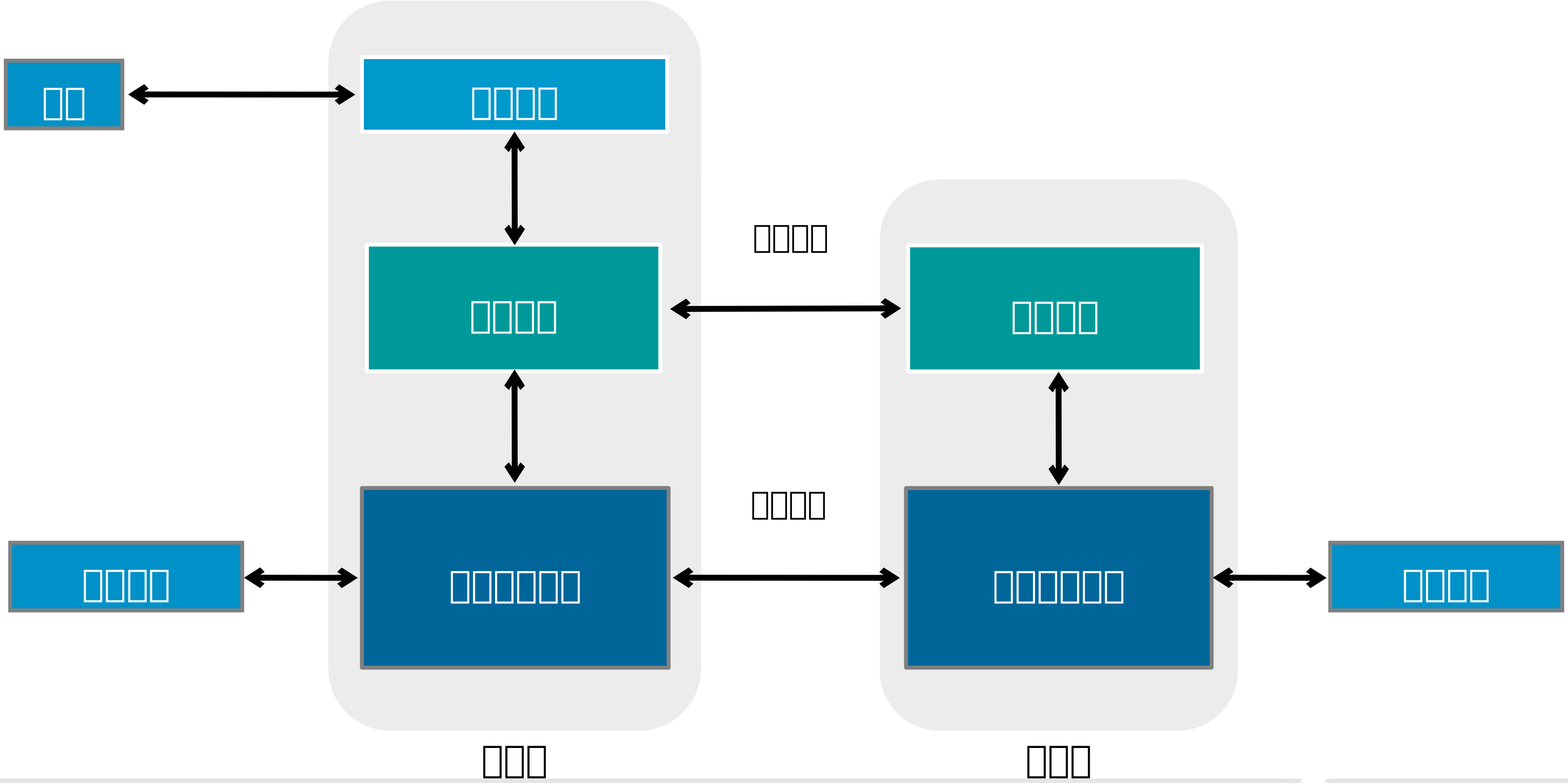
[illegible]

1. TCP/IP [illegible]
2. **[illegible]**
   - [illegible]
   - [illegible]
   - **[illegible]**
3. [illegible]


SIP
WEB
.COM
FTP
Mail
DNS
S
PC

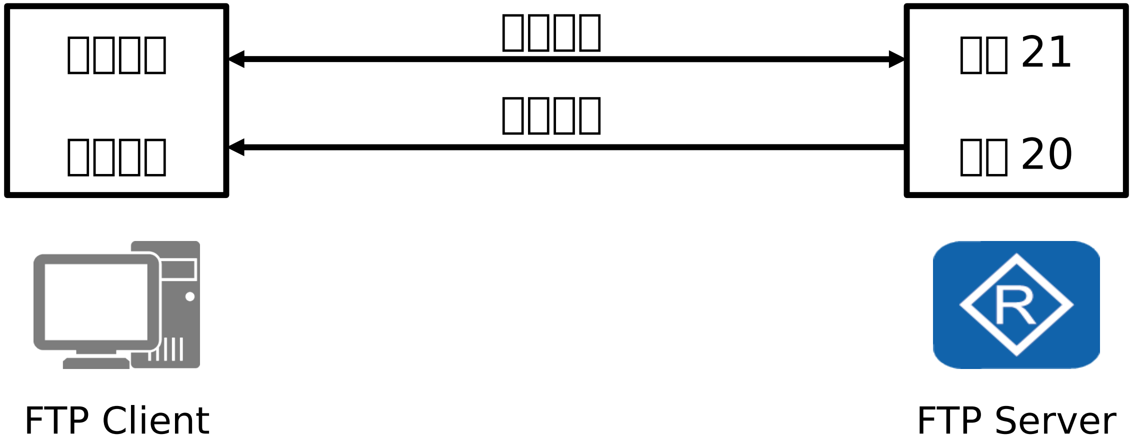
FTP □□

- FTP □□□□□□□□□□□□□□□□□□□□□□□□□□□□
- □□ FTP □□□□□□□□□□□□□□□□□□□□□□□□□□□□□□



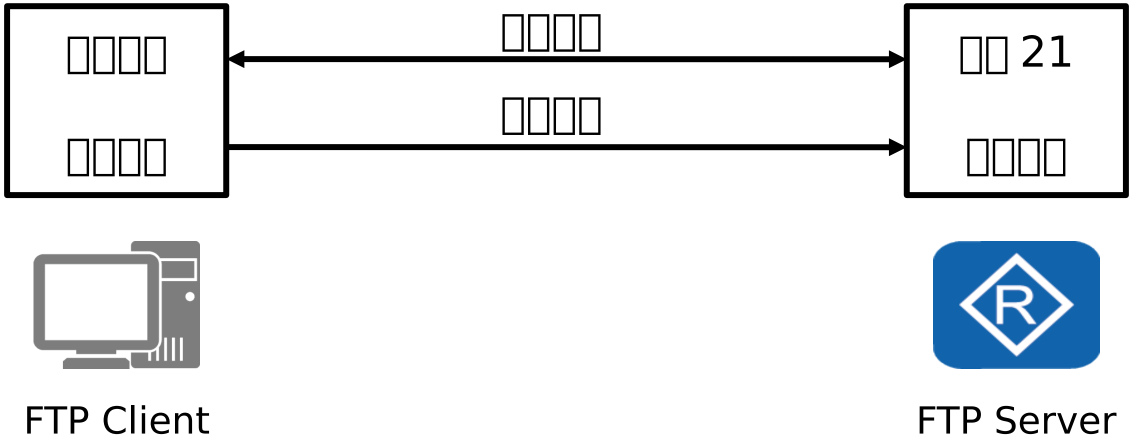
FTP [illegible] (1)

- FTP [illegible]
- [illegible] FTP [illegible]



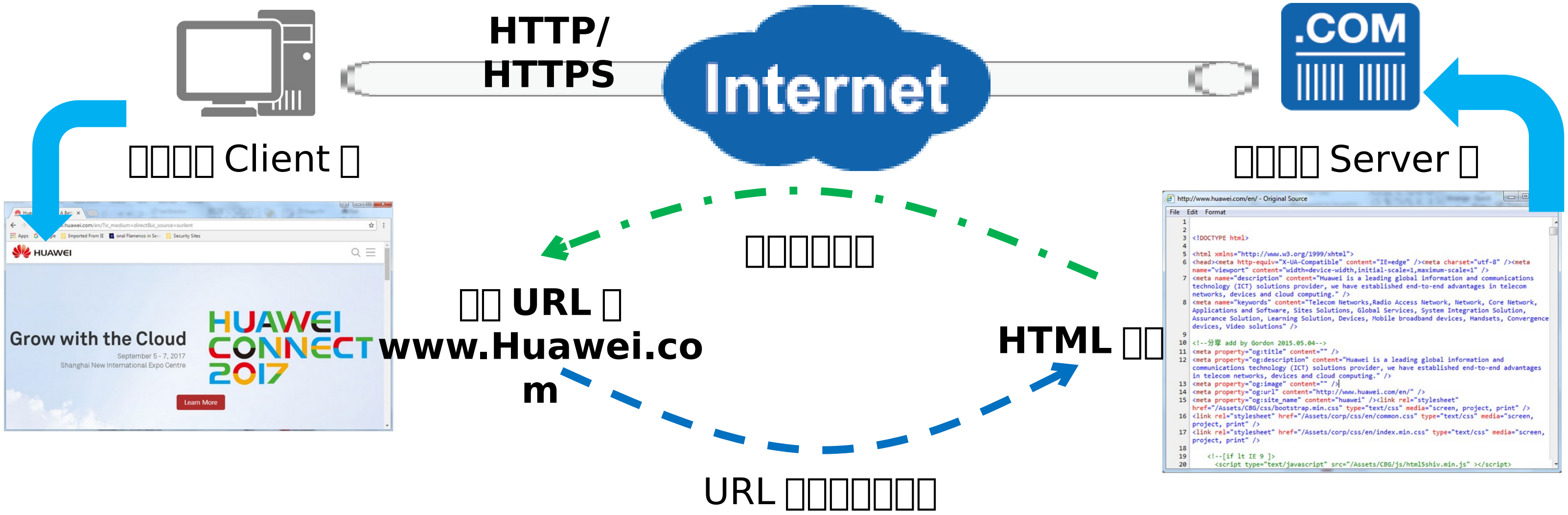
FTP [illegible] (2)

- [illegible] FTP [illegible]:



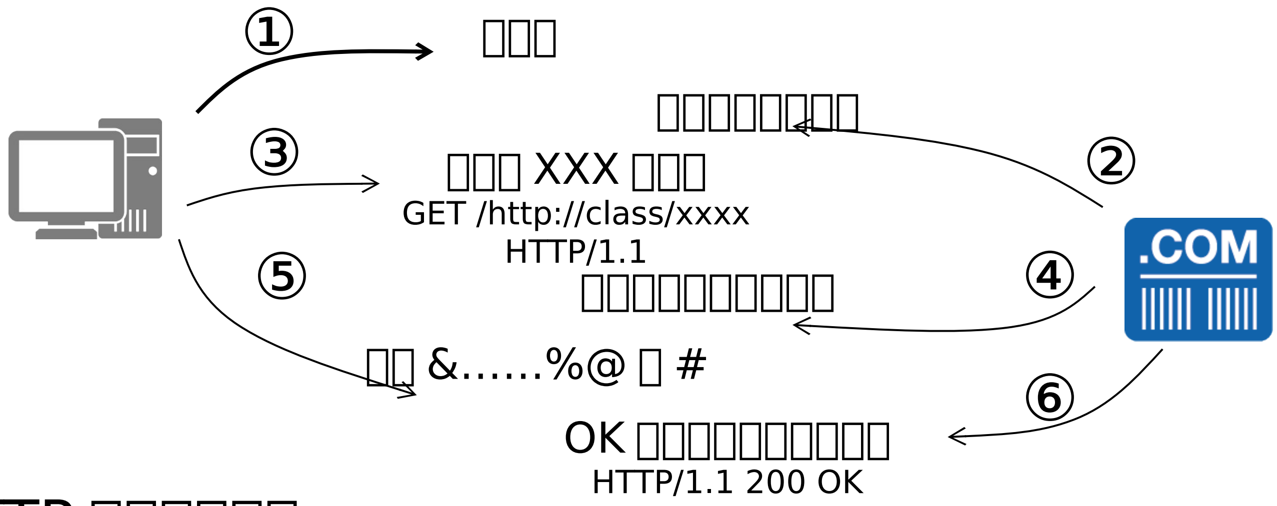
HTTP/HTTPS - Web [illegible]

- Web [illegible] Client [illegible] Server [illegible]
  - [illegible] HTML [illegible] HyperText Mark-up Language [illegible]
  - [illegible] URL [illegible] Uniform Resource Locator [illegible]
  - [illegible] HTTP [illegible] HyperText Transfer Protocol [illegible]



HTTP □□□□

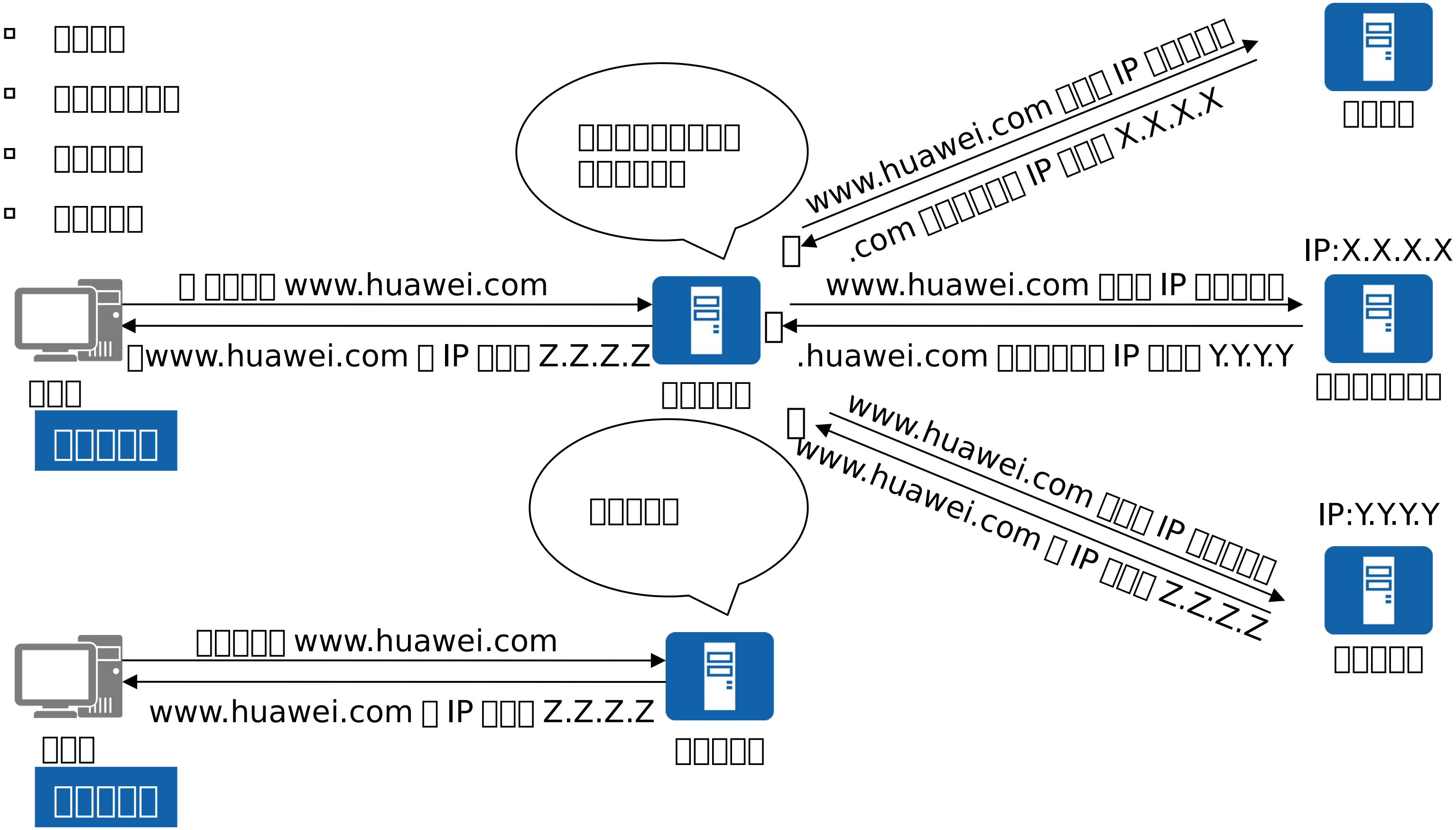
- HTTP □ Hypertext Transfer Protocol □□□□□□□□□□□□□□□□□□□ - □□□□□ requests/responses □□



- HTTP □□□□□□
  - □□□□—□□□□□□□□□□□□□□□
  - □□□□—□□□□□□□□□□□□

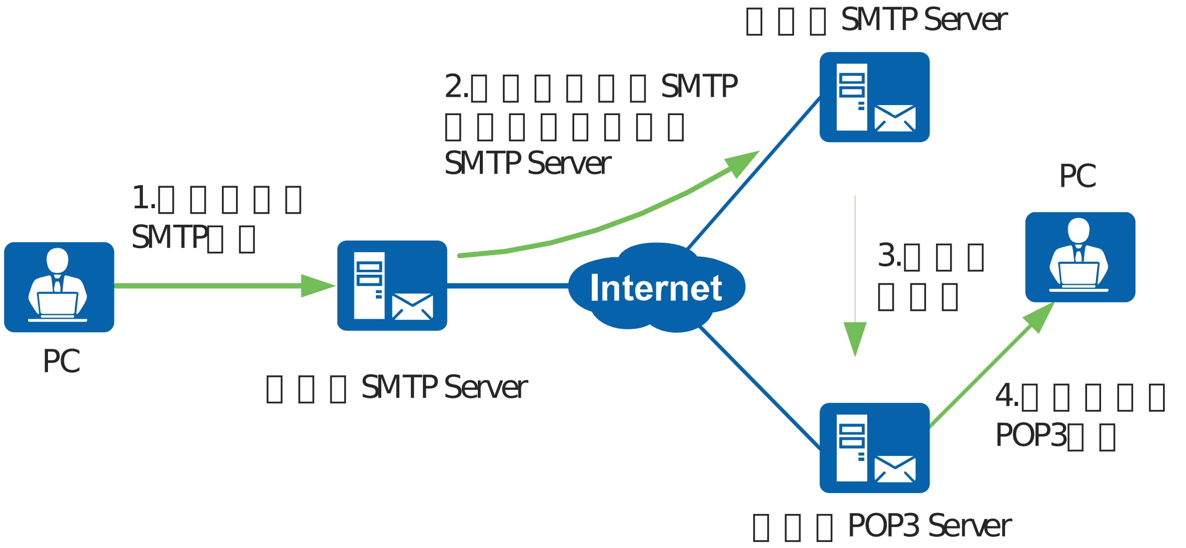
DNS □□□□

- □□□□□□□□□□□□□□ Domain Name System □□□ DNS □□□□□ DNS □□□□□□□□□□□□□□□
□
    - □□□
    - □□□□□
    - □□□□
    - □□□□



SMTP/POP3/IMAP - [illegible]

- SMTP [illegible] SMTP Server [illegible] SMTP Server [illegible]
- POP3 [illegible] Post Office Protocol 3 [illegible] 3 [illegible] IMAP [illegible] Internet Mail Access Protocol [illegible]
- [illegible] SMTP [illegible] POP3 [illegible] IMAP [illegible] PC [illegible] MicroSoft OutLook [illegible] FoxMail [illegible]



[illegible]

1. [illegible]TCP/IP[illegible]（ ）
   - A. [illegible]
   - B. [illegible]
   - C. [illegible]
   - D. [illegible]
2. [illegible]TCP[illegible]（ ）
   - A. SYN+ACK
   - B. SYN
   - C. ACK
   - D. FIN

[illegible]

- TCP/IP [illegible]
- [illegible]

[illegible]

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